

1. A self-aligned conductive region to active region structure comprising:
a semiconductor region within a substrate extending to a surface;
5 parallel active regions separated by STI regions within said semiconductor region,
said STI regions having an insulator liner layer grown over its sides and being filled with an
insulator filler layer;
equally spaced gate insulator regions, formed prior to said STI regions, disposed over
said active regions and overlapping a portion of said insulator liner layer;
10 conductive regions disposed over said gate insulator regions and formed prior to said
STI regions.
2. The structure of Claim 1 wherein said semiconductor region is a silicon region.
3. The structure of Claim 1 wherein said substrate is a silicon substrate.
4. The structure of Claim 1 wherein said gate insulator regions are oxide regions.
- 15 5. The structure of Claim 1 wherein said insulator liner layer is a grown oxide layer.
6. The structure of Claim 1 wherein said insulator filler layer is an HDP oxide layer.
7. The structure of Claim 1 wherein said conductive regions are composed of doped
polysilicon.
8. The structure of Claim 1 wherein said conductive regions are gates of semiconductor
20 integrated circuit devices.
9. A self-aligned floating gate to active region structure comprising:
a semiconductor region within a substrate extending to a surface;

parallel active regions separated by STI regions within said semiconductor region,
said STI regions having an insulator liner layer grown over its sides and being filled with an
insulator filler layer;

5 equally spaced gate insulator regions, formed prior to said STI regions, disposed over
said active regions and overlapping a portion of said insulator liner layer;

floating gates disposed over said gate insulator regions and formed prior to said STI
regions.

10. The structure of Claim 9 wherein said semiconductor region is a silicon region.

11. The structure of Claim 9 wherein said substrate is a silicon substrate.

10 12. The structure of Claim 9 wherein said gate insulator regions are oxide regions.

13. The structure of Claim 9 wherein said insulator liner layer is a grown oxide layer.

14. The structure of Claim 9 wherein said insulator filler layer is an HDP oxide layer.

15. The structure of Claim 9 wherein said floating gates are composed of doped
polysilicon.

15 16. A method of fabricating a self-aligned conductive region to active region structure
comprising:

providing a semiconductor region within a substrate extending to a surface,

forming a gate insulator layer over said semiconductor region;

forming, sequentially, a conductive layer, an insulator layer and a hard mask layer over
20 said gate insulator layer;

patterning said gate insulator layer, said conductive layer, said insulator layer and said
hard mask layer to form four tiered parallel stripes;

forming a spacer insulator layer over the sidewalls of said parallel stripes;

forming trenches in said semiconductor region between said parallel stripes;

growing an insulator liner layer over sides of said trenches and depositing an insulator filler layer so that said trenches and the space between said parallel stripes are filled with said insulator filler layer;

planarizing so that said insulator filler layer above top of said insulator layer is removed
5 and said hard mask is removed;

etching said filler layer so that it just fills said trenches;

removing said insulator layer and said insulator spacer layer;

patterning said conductive layer to form separated conductive regions.

17. The structure of Claim 16 wherein said semiconductor region is a silicon region.
- 10 18. The structure of Claim 16 wherein said substrate is a silicon substrate.
19. The structure of Claim 16 wherein said gate insulator regions are oxide regions.
20. The structure of Claim 16 wherein said insulator liner layer is a grown oxide layer.
21. The structure of Claim 16 wherein said insulator filler layer is an HDP oxide layer.
22. The structure of Claim 16 wherein said conductive layer is composed of doped
15 polysilicon.
23. The method of Claim 16 wherein said insulator layer is a nitride layer.
24. The method of Claim 16 wherein said hard mask layer is an oxide layer.
25. The method of Claim 16 wherein said insulator spacer layer is a nitride layer.
26. The method of Claim 16 wherein said planarizing is performed using CMP.
- 20 27. The structure of Claim 16 wherein said conductive regions are gates of semiconductor integrated circuit devices.
28. A method of fabricating a self-aligned floating gate to active region structure comprising:
providing a semiconductor region within a substrate extending to a surface,

- forming a gate insulator layer over said semiconductor region;
- forming, sequentially, a conductive layer, an insulator layer and a hard mask layer over said gate insulator layer;
- patterning said gate insulator layer, said conductive layer, said insulator layer and said
- 5 hard mask layer to form four tiered parallel stripes;
- forming a spacer insulator layer over the sidewalls of said parallel stripes;
- forming trenches in said semiconductor region between said parallel stripes;
- growing an insulator liner layer over sides of said trenches and depositing an insulator
- filler layer so that said trenches and the space between said parallel stripes are filled with said
- 10 insulator filler layer;
- planarizing so that said insulator filler layer above top of said insulator layer is removed and said hard mask is removed;
- etching said filler layer so that it just fills said trenches;
- removing said insulator layer and said insulator spacer layer;
- 15 patterning said conductive layer to form separated floating gates.
29. The structure of Claim 28 wherein said semiconductor region is a silicon region.
30. The structure of Claim 28 wherein said substrate is a silicon substrate.
31. The structure of Claim 28 wherein said gate insulator regions are oxide regions.
32. The structure of Claim 28 wherein said insulator liner layer is a grown oxide layer.
- 20 33. The structure of Claim 28 wherein said insulator filler layer is an HDP oxide layer.
34. The structure of Claim 28 wherein said conductive layer is composed of doped polysilicon.
35. The method of Claim 28 wherein said insulator layer is a nitride layer.
36. The method of Claim 28 wherein said hard mask layer is an oxide layer.

37. The method of Claim 28 wherein said insulator spacer layer is a nitride layer.
38. The method of Claim 28 wherein said planarizing is performed using CMP.
39. A method of fabricating a self-aligned conductive region to active region structure comprising:
- 5 providing a semiconductor region within a substrate extending to a surface,
forming a gate insulator layer over said semiconductor region;
forming, sequentially, a conductive layer and an insulator layer over said gate insulator layer;
patterning said gate insulator layer, said conductive layer and said insulator layer to form
- 10 three tiered parallel stripes;
forming a spacer insulator layer over the sidewalls of said parallel stripes;
forming trenches in said semiconductor region between said parallel stripes;
growing an insulator liner layer over sides of said trenches and depositing an insulator filler layer so that said trenches and the space between said parallel stripes are filled with said
- 15 insulator filler layer;
planarizing so that said insulator filler layer above top of said insulator layer is removed;
etching said filler layer so that it just fills said trenches;
removing said insulator layer and said insulator spacer layer;
patterning said conductive layer to form separated conductive regions.
- 20 40. The structure of Claim 39 wherein said semiconductor region is a silicon region.
41. The structure of Claim 39 wherein said substrate is a silicon substrate.
42. The structure of Claim 39 wherein said gate insulator regions are oxide regions.
43. The structure of Claim 39 wherein said insulator liner layer is a grown oxide layer.
44. The structure of Claim 39 wherein said insulator filler layer is an HDP oxide layer.

45. The structure of Claim 39 wherein said conductive layer is composed of doped polysilicon.
46. The method of Claim 39 wherein said insulator layer is a nitride layer.
47. The method of Claim 39 wherein said insulator spacer layer is a nitride layer.
- 5 48. The method of Claim 39 wherein said planarizing is performed using CMP.
49. The structure of Claim 39 wherein said conductive regions are gates of semiconductor integrated circuit devices.
50. A method of fabricating a self-aligned floating gate to active region structure comprising:
- 10 providing a semiconductor region within a substrate extending to a surface,
forming a gate insulator layer over said semiconductor region;
forming, sequentially, a conductive layer and an insulator layer over said gate insulator layer;
patterning said gate insulator layer, said conductive layer and said insulator layer to form
- 15 three tiered parallel stripes;
forming a spacer insulator layer over the sidewalls of said parallel stripes;
forming trenches in said semiconductor region between said parallel stripes;
growing an insulator liner layer over sides of said trenches and depositing an insulator filler layer so that said trenches and the space between said parallel stripes are filled with said
- 20 insulator filler layer;
planarizing so that said insulator filler layer above top of said insulator layer is removed;
etching said filler layer so that it just fills said trenches;
removing said insulator layer and said insulator spacer layer;
patterning said conductive layer to form separated floating gates.

- 51. The structure of Claim 50 wherein said semiconductor region is a silicon region.
- 52. The structure of Claim 50 wherein said substrate is a silicon substrate.
- 53. The structure of Claim 50 wherein said gate insulator regions are oxide regions.
- 54. The structure of Claim 50 wherein said insulator liner layer is a grown oxide layer.
- 5 55. The structure of Claim 50 wherein said insulator filler layer is an HDP oxide layer.
- 56. The structure of Claim 50 wherein said floating gates are composed of doped polysilicon.
- 57. The method of Claim 50 wherein said insulator layer is a nitride layer.
- 58. The method of Claim 50 wherein said insulator spacer layer is a nitride layer.
- 10 59. The method of Claim 50 wherein said planarizing is performed using CMP.